

Classification 1: Using Dichotomous Keys

Middle School Scientists Curriculum

Class Time Required:

1 class period (50-65 minutes)
Extension (up to 1 hour)

Materials Needed:

- Engagement: Ten Pictures of Different Organisms
- Investigation and Explanation: Attachment 1 “Classification 1: Using Dichotomous Keys”, 12 X 18 Construction Paper for Posters, Students need to provide Ten Pictures for their own Key, Worksheet 1, “Classification 1: Using Dichotomous Keys” (grading rubric)
- Extension: Keys or Books to practice identifying with keys

Teacher Preparation: 30-60 minutes to review activity, collect materials, and make copies; Extension: 1-2 hours to collect materials

Student Knowledge: research skills; observational skills

Vocabulary: dichotomous key, organism

Next Generation Science Standards:

• MS-LS4-2.

Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.

• MS-LS4-1, MS-LS4-2 Crosscutting Concepts

Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation.

Overview:

A dichotomous key is an important scientific tool, used to identify different organisms, based the organism’s observable traits. Dichotomous keys consist of a series of statements with two choices in each step that will lead users to the correct identification. This type of key is not hard to use, but makes more sense when students undertake the process of making one before using it. The instructor will model the process before students begin work on their own keys. After the demonstration, students will first make a Branching Key using a picture of an organism of their choice. Once the Branching Key is completed, students will convert it into a written dichotomous key. The end product will be a poster displaying the student pictures, along with their written dichotomous keys.

Background Information:

Scientists have catalogued 1.5 million species on Earth and estimate that there might be as many as 100 million more unidentified species (Giller, 2014). Classification keys are tools that provide a means to correctly identify different organisms, based on observable traits. Most such keys are created in a dichotomous format. Dichotomous literally means dividing into two parts (Merriam-Webster, 2014). A dichotomous key provides users with a series of statements with two choices that will eventually lead to the correct identification of the organism. To use a dichotomous key, one must be able to make accurate observations and follow directions carefully.

Focus Questions:

How can you identify an unknown organism?

What types of characteristics can be used to identify an organism?

How do you use a dichotomous key and why is a dichotomous key important?

**Learning Target:**

I can construct and use a dichotomous key based on different organisms' characteristics.

Engagement:

(10-15 minutes)

The instructor will find ten pictures of different plants and animals that depict the complete body of the organism rather than a partial or face shot. Pictures can be projected on a smart board or overhead projector, or magnets can be placed on the back of pictures for placement on the blackboard. Pictures should be diverse and have evident easily seen characteristics. The instructor will ask the students to observe traits of the displayed organisms. Dichotomous keys are based on observations, so the instructor should encourage students to use observable characteristics, rather than behaviors. For example, if the picture depicts an owl, accept the observation "they have eyes that face toward the front." Do not accept the observation "they hunt at night." For the students' dichotomous keys to work, the observations must be ones that the students can see in the pictures because not all students are at the same level of knowledge. Students will then use the pictures to model the process of creating a dichotomous key.

Investigation:

(25-30 minutes)

1. Prior to the class, direct students to collect ten pictures of plants and animals, stressing that the photos should depict the entire body of the organism. These will be used after the instructor's demonstration.

2. Model the process of creating a Branching and written Dichotomous Key with the students. See Attachment 1 "Classification 1: Using Dichotomous Keys" for step-by-step directions.

4. After modeling the process, direct students to take out the ten pictures that they collected for their project. Students will then go through the same process to create a dichotomous key unique to their pictures.
3. Have students check another student's key to make sure they "work" and are correct before working on their final presentation.

Explanation:

(15-20 minutes)

Students will make a poster with a written dichotomous key and pictures on the front and their branching keys (rough draft) on the back. Give each student a copy of the Worksheet 1, "Classification 1: Using Dichotomous Keys" for a grading rubric to guide them on the requirements for their project. After grading, students should display their dichotomous keys around the room for all students to observe.

Extension:

(up to 1 hour)

Students will be given different unknown organisms with keys for identification and will work through the identification process. Sources of keys: internet or textbooks. Instructors may also wish to use field guides for local areas, using pictures of animals or plants that students might see in their backyards or parks. Good sources are the Peterson First Guides. Also, the internet can be searched for "sample dichotomous keys" and will yield multiple examples.

References:

"Dichotomous." *Merriam-Webster*. Merriam-Webster, n.d. Web. 16 Aug. 2014.
<<http://www.merriam-webster.com/dictionary/dichotomous>.>

Giller, Geoffrey. "Are We Any Closer to Knowing How Many Species There Are on Earth?" *Scientific American Global RSS*. Scientific American, 8 Apr. 2014. Web. 16 Aug. 2014. <<http://www.scientificamerican.com/article/are-we-any-closer-to-knowing-how-many-species-there-are-on-earth>.>